

Serial No. 09/991,196
Reply to Office Action of July 14, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

Claims 1–20 (cancelled).

21. (Previously presented) A method for forming conducting structures separated by gaps on a substrate, comprising the steps of:

providing a substrate and a wiring layer above the substrate;

forming a cap layer above the wiring layer;

forming a mask layer above the cap layer;

etching the mask layer to expose selected portions of the cap layer;

etching the cap layer using the mask layer as a mask;

removing the mask layer to expose remaining portions of the cap layer;

etching the wiring layer using the remaining portions of the cap layer as a mask to form wiring lines separated by gaps, the wiring lines having the remaining portion of the cap layer thereon, wherein the mask layer is removed prior to the etching of the wiring layer; and

depositing a dielectric material within the gaps at a sputtering rate sufficient to fill the gaps, using high density plasma chemical vapor deposition.

22. (Previously presented) The method of claim 21, wherein the cap layer comprises a material selected from the group consisting of a silicon nitride material and an oxynitride material.

23. (Previously presented) The method of claim 21, wherein a remaining portion of the cap layer on at least one wiring line has a rectangular shape in cross section.

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24. (Previously presented) The method of claim 21, wherein a remaining portion of the cap layer on at least one wiring line has a trapezoidal shape in cross section.

25. (Previously presented) The method of claim 21, wherein the trapezoidal shape includes top and bottom surfaces parallel to one another and side surfaces that extend inwardly from the bottom surface to the top surface.

26. (Previously presented) The method of claim 21, wherein the remaining portion of the cap layer on at least one wiring line has a triangular shape in cross section.

27. (Previously Presented) The method of claim 21, wherein a remaining portion of the cap layer on at least one wiring line has, in cross section, a rectangular shape having its upper comers etched away.

28. (Previously presented) The method of claim 21, wherein a remaining portion of the cap layer is partially etched and redeposited into the gaps during the high density plasma chemical vapor deposition process.

29. (Previously presented) The method of claim 21, wherein a remaining portion of the cap layer is partially etched during the deposition of a dielectric material using high density plasma chemical vapor deposition.

30. (Previously presented) The method of claim 21, wherein the mask layer comprises a patterned photoresist layer.

31. (Previously presented) The method of claim 21, further comprising the formation of a surface layer between the substrate and the wiring layer, the surface layer being a barrier between the substrate and wiring layer.

32. (Previously presented) The method of claim 21, wherein the cap layer comprises an oxide.

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33. (Currently amended) The method of claim 21, wherein an amount of the likelihood of contaminants being deposited within the gaps filled with the dielectric material is decreased by comparison to a process in which the mask layer is not removed prior to etching the wiring line.

34. (Previously presented) The method of claim 33, wherein said contaminants include carbon compounds.

35. (Currently Amended) A method for forming conducting structures separated by gaps on a substrate, comprising the steps of:

providing a substrate and a wiring layer above the substrate;

forming a cap layer above the wiring layer;

forming a mask layer above the cap layer;

patterning the mask layer to expose selected portions of the cap layer;

etching the cap layer, and the wiring layer, at the locations where the cap layer is exposed by the patterned mask layer, to form wiring lines separated by gaps without depositing contaminants from the mask layer in the gaps, the wiring lines having a remaining portion of the cap layer thereon; and

depositing a dielectric material within the gaps at a sputtering rate sufficient to fill the gaps, using high density plasma chemical vapor deposition,

wherein the mask layer is removed prior to the etching of the wiring layer.

36. (Cancelled).

37. (Previously presented) The method of claim 35, wherein the etched cap layer is used as a hard mask during the etching of the wiring layer.

38. (Previously presented) The method of claim 35, wherein an amount of contaminant deposited in the gaps filled with the dielectric material is decreased by comparison to a process in which the mask layer is not removed prior to etching the wiring line layer.

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39. (Previously Presented) The method of claim 38, wherein said contaminants include carbon compounds.

40. (Previously presented) A method for forming conducting structures separated by gaps on a substrate, comprising the steps of:

providing a substrate and a wiring layer above the substrate;

forming a cap layer comprising nitride and/or silicon rich-oxide above the wiring layer;

forming a mask layer above the cap layer;

etching the wiring layer using the mask layer to form wiring lines separated by gaps, the wiring lines having a remaining portion of the cap layer thereon;

depositing a dielectric material within the gaps at a sufficiently high etch to deposition ratio to fill the gaps, using a high density plasma chemical vapor deposition (HDPCVD) process;

wherein the remaining portion of the cap layer protects top corner sections of the wiring lines during the HDPCVD process.

41. (Previously Presented) The method of claim 40, wherein a facet is formed in the remaining portion of the cap layer during the HDPCVD process.

42. (Previously Presented) The method of claim 40, wherein the cap layer is formed with a facet adapted to reduce etching during the HDPCVD process.

43. (Previously Presented) The method of claim 40 wherein the cap layer comprises a material selected from the group consisting of a silicon nitride material and an oxynitride material.

44. (Previously presented) The method of claim 40, wherein a sputtering rate of the HDPCVD process varies while the gaps are being filled with the dielectric material.